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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/024,107	12/17/2001	Sami Haapoja	872.0105.U1(US)	3127

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HARRINGTON & SMITH, LLP  
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EXAMINER
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JAMAL, ALEXANDER

ART UNIT	PAPER NUMBER
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2614

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/11/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

# Office Action Summary

Application No.

10/024,107

Applicant(s)

HAAPOJA ET AL.

Examiner

Alexander Jamal

Art Unit

2614

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☐ Claim(s) \_\_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20,24-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Amendment*

1. Based upon the submitted amendment (11-6-2006), entered via RCE, the examiner notes that claims 1-5,8,15,25-29,32,33 have been amended.
2. Applicant states that claim 27 has been cancelled in remarks page 10. However, the most current claimset shows claim 27 as 'currently amended'. As such claim 27 is still under consideration.
3. In addition to the cited prior art patents below, the examiner notes prior art patents to Sakuma (6212371) and Ezuriko (5444738) that teach channel selective equalization in mobile telephones.

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:  
  
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
2. Claim 27, rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As per **claim 27**, the claim states that the second end-transmit-RF-channel is closer in frequency to the first end-receive-RF-channel than any other transmit channel. It is not clear how or why a communications system would space the end transmit

channel closer to a receive channel than any other transmit channel. For the purposes of examination, examiner assumes the claim means that the end-transmit-RF-channel is closer to the first end-receive-RF-channel than to any other **receive** channel.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 1-11,13-23,25,29** rejected under 35 U.S.C. 103(a) as being unpatentable over Abdelgany et al. (6584090), and further in view of Shalom et al. (6166601) and further in view of Abdelmonem et al. (6622028).

As per **claims 1, 8, 29**, Abdelgany discloses a transceiver comprising a transmit path and receive path (Fig. 4). Both paths comprise RF filters (164,92,168,98,176,78,74,156 ect.). The system is a CDMA system with frequency band channels. The device further comprises antenna 22 coupled to both the transmit and receive paths. However, Abdelgany does not disclose circuitry to selectively compensate selected channels for the non-linearity of both transmit and receive RF filters.

Shalom discloses a transceiver that applies digital equalization to the RF amplifier and associated components in order to produce highly linear amplification (Col 3 lines 29-65). The equalization (predistortion) is applied by equalizer 104 (Fig. 3) on the signal

Art Unit: 2614

to be transmitted (via antenna 38) (Col 7 line 62 to Col 8 line 9). Shalom discloses that the equalization can be performed to correct non-linearities on the power amplifier or any other circuitry of amplifier 100 (Fig. 3, Col 7 line 61 to Col 8 line 10). Examiner reads the circuitry of amplifier 100 as an RF filter that passes a band of frequencies. The equalizer will operate on any frequency band channel to be transmitted. Examiner reads any frequency band signal that is present in the transmitter path to be 'selected'.

Examiner additionally notes the phrase 'when the at least one RF channel is selected' in applicant's claim 1. In the case that all channels are 'selected' then all channels will be equalized and the full bandwidth equalization of Shalom will read on claim 1. Examiner notes that claims 8 and 29 also recite that at least one signal may be selected. It would have been obvious to one of ordinary skill in the art at the time of this application to implement digital equalization for both the transmit and receive amplifiers and associated circuitry (the amplifier and circuitry inherently comprise RF filter because they have an impedance that has a certain frequency response at RF frequencies) for the advantage of producing a highly linear response from the circuit.

Abdelmonem discloses a transceiver (Col 3 line 60 to Col 4 line 15) and teaches that an equalizer may be used to compensate for the received signal that is subject to the non-linear behavior of the receive RF filters (Col 5 line 58 to Col 6 line 5) in wide channel systems such as W-CDMA. As in the case of Shalom, the examiner additionally notes the phrase 'when the at least one RF channel is selected' in applicant's claim 1. In the case that all channels are 'selected' then all channels will be equalized and the full bandwidth equalization of Abdelmonem will read on claim 1. It would have been

Art Unit: 2614

obvious to one of ordinary skill in the art at the time of this application to implement digital equalization in the transceiver for the advantage of compensating for nonlinear filter effects.

2<sup>nd</sup> set of claim rejections for claims 1,8,15,25,29

*Claim Rejections - 35 USC § 103*

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 1,8,15,25,29** rejected under 35 U.S.C. 103(a) as being unpatentable over Abdelgany et al. (6584090), and further in view of Abdelmonem et al. (6622028) and further in view of Uddenfeldt et al. (5212803).

As per **claims 1,8,15,25,29**, Abdelgany discloses a transceiver comprising a transmit path and receive path (Fig. 4). Both paths comprise RF filters (164,92,168,98,176,78,74,156 ect.). The system is a CDMA system with frequency band channels. The device further comprises antenna 22 coupled to both the transmit and receive paths. Abdelgany discloses that the transmit/receive signals are converted

Art Unit: 2614

to/from baseband (Fig. 3). Abdelgany additionally discloses that the baseband signals may be sent to signal processing electronics (in BASEBAND form) (Col 5 lines 25-35). However, Abdelgany does not disclose circuitry to selectively compensate only selected channels (a subset of the total set of transmit and receive channels) for the non-linearity of both transmit and receive RF filters.

Abdelmonem discloses a transceiver (Col 3 line 60 to Col 4 line 15) and teaches that an equalizer may be used to compensate for the received signal that is subject to the non-linear behavior of the receive RF filters (Col 5 line 58 to Col 6 line 5) in wide channel systems such as W-CDMA. It would have been obvious to one of ordinary skill in the art at the time of this application to implement digital equalization in the transceiver as the baseband signal processing electronics already contemplated by Abdelgany, for the advantage of compensating for nonlinear filter effects of all the RF filters used in Abdelgany.

Uddenfeldt teaches that equalizers used in mobile phones cause a large amount of power consumption (Col 1 lines 45-50). He teaches that channels (Col 3 lines 5-23) can be monitored and each channel can (once selected) be equalized. The other channels are not equalized while the selected channel is being equalized (Fig. 4, Col 4 lines 30-50, Col 6 lines 15-30). The system checks each channel with and without equalization. Uddenfeldt's teachings would allow an equalizer to selectively equalize a selected channel, including the end channels of a transmit or receive band of channels. As per applicant's claim language the selected channel is the channel currently being demodulated or modulated and being acted upon by the signal processing disclosed by

Art Unit: 2614

Abdelgany. It would have been obvious to one of ordinary skill in the art at the time of this application to implement the selective measuring and equalizing taught by Uddenfeldt for the purpose of detecting which channels required equalization and allowing a power savings by not having the equalizer active for all channels at all times.

As per **claims 2,3,9,10**, the device of the claim 1 rejection could compensate for all transmit and receive channels or any specific subset of the channels.

As per **claim 17**, Abdelgany discloses that the transceiver may be a direct conversion receiver.

As per **claims 6,7,13,14,18,19**, Abdelmonem discloses that the system may be a W-CDMA system, which has the same ranges of transmit and receive frequencies as specified in claim 6.

As per **claim 20,31**, the claims are rejected for the same reasons as claim 1. The digital signal processing electronics disclosed by Abdelgany (Col 5 lines 25-35) will function to predistort a signal to be modulated and then transmitted.

As per **claims 26,27,32,33**, as per Uddenfeldt's teachings, any subset of selected channels (including the end-channels of the transmit and receive bands) may be equalized or not equalized depending on the monitoring results taught by Uddenfeldt.



As per **claim 28**, the transmit signals all follow the transmit path (including any filtering stages along the way) and the receive signals follow the receive path (including any filtering stages along the way).

As per **claim 31**, Shalom discloses that the transmitted signal is digitally pre-distorted (as per the claim 1 rejection).

8. **Claims 4,5,11,16,30**, rejected under 35 U.S.C. 103(a) as being unpatentable over Abdelgany et al. (6584090), in view of Abdelmonem et al. (6622028) and Uddenfeldt et al. (5212803) as applied to claims 1,8,15,25,29, and further in view of Shalom et al. (6166601).

As per **claims 4,11,16,30**, Abdelgany, Abdelmonem and Uddenfeldt disclose applicant's independent claims, but they do not specify the specifics of the implementation of the equalizer.

Shalom discloses an equalizer used to compensate for RF distortion in a wireless transceiver. The equalizer device comprises an FIR which is a DSP (SHALOM: Col 3 lines 45-65, Col 7 line 62 to Col 8 line 9). The equalization circuit functions by changing coefficients in the equalizer. It would have been obvious to one of ordinary skill in the art at the time of this application to implement the well known DSP circuit comprising an adaptive FIR filter as part of the equalizer for the purpose of providing an efficient well known digital implementation of the digital signal processing circuitry,

Art Unit: 2614

9. **Claims 12,24** rejected under 35 U.S.C. 103(a) as being unpatentable over Abdelgany et al. (6584090) in view of Abdelmonem et al. (6622028) and Uddenfeldt et al. (5212803) as applied to claims 1,8, and further in view of Lindoff (6373888).

As per **claims 12,5**, Abdelgany, Abdelmonem and Uddenfeldt disclose the use of an equalizer, but they do not disclose the specifics of the equalizer, including that the number of taps of an FIR filter may be varied in compensating for the transmit and receive signals.

Lindoff discloses an FIR based equalizer that has a variable amount of taps (ABSTRACT,). Lindoff teaches that a variable number of taps allows the equalizer to be adapted as a function of channel response and allows processing and power savings (Col 4 lines 15-40). It would have been obvious to one of ordinary skill in the art at the time of this application to implement a variable number of taps for the equalizer filter for the advantage of power and processor savings.

As per **claim 24**, claim rejected as per claim 1. The equalization would obviously have been implemented in baseband.

### ***Response to Arguments***

3. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Art Unit: 2614

As per applicant's arguments that none of the cited prior art discloses the equalization circuitry implemented in baseband. Examiner notes the newly cited portions of the Abdelgany reference (Col 5 lines 25-35) that discloses additional; signal processing circuitry implemented in baseband. Examiner contends it would have been obvious to implement the equalizer as part of the baseband 'signal processing electronics' contemplated by Abdelgany.

As per applicant's arguments that Uddenfeldt does not disclose not compensating for a subset of the transmit/frequency bands, examiner contends that Uddenfeldt's system would allow for any combination of channels to be equalized or not equalized depending on the results of Uddenfeldts monitoring system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Jamal whose telephone number is 571-272-7498. The examiner can normally be reached on M-F 9AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis A Kuntz can be reached on 571-272-7499. The fax phone numbers for the organization where this application or proceeding is assigned are 571-273-8300 for regular communications and 571-273-8300 for After Final communications.

AS  
Dec, 28 2006

  
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